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CYPERACEAE OF EAST AFRICA - III

By

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FICINIA Schrad.

Southern Africa is the main centre of distribution for the numerous species of Ficinia. Only two out of over 60 species have been recorded as occurring in eastern Africa, the remainder are endemic in the southern part of the continent. These two species can be found in the upland and montane grass or ericaceous moorlands, there are few records below 8,000 ft.

Both species show a marked resemblence to those Bulbostylis species with dense capitate inflorescences, slender culms and setaceous glabrous leaves, but they may be readily distinguished by the stout, usually elongated woody rhizome and by the nutlet. Spikelet structure is as in Bulbostylis. The styles are 3-fid. The nutlets are trigonous and smooth with a fine gynophore similar to those seen in Scleria, which is often difficult to see at magnifications less than x20, and a persistent but rarely swollen style-base similar to those of Bulbostylis and Fuirena.

Key to Species

1. Plant and glumes glabrous; the style branches in the lower half; nutlets smooth 2
   Plant and glumes finely pubescent or hairy; style entire for over half its length; nutlets wrinkled ..... Bulbostylis atrosanguinea

2. Leaves very fine; heads of 1 - 6 spikelets..... 1. F. filiformis
   Leaves setaceous, stiff; heads of 6 - 20 spikelets. 2. F. gracilis

1. F. filiformis Schrad. (Fig. 12)
   Glabrous perennial up to 10 ins. high with a woody rhizome. Head blackish brown, 5 - 10 mm diam. with 4 - 7 mm long spikelets. Anthers less than 2 mm long. Steep rocky hillsides, grassland and moorland; 6,000 - 11,000 ft.
TANGANYIKA - Longido, Kilimanjaro, Usambara Mts., Rungwe and the Elton Plateau.

2. F. gracilis Schrad. (Fig. 13)
   Glabrous perennial up to 18 ins. high with a woody rhizome. Head chestnut or brown, 15 mm diam. with numerous 3 - 9 mm long spikelets. Anthers less than 2 mm long. In Protea, Erica and grass moorland; 8,000 - 15,000 ft.
KENYA - Mt. Kenya.
TANGANYIKA - Kilimanjaro, Uluguru Mts., and Rungwe.

BULBOSTYLIS Kunth ex C.B. Clarke

Bulbostylis is quite a large genus with a pantropical and warm temperate distribution, and is especially abundant in Africa and America. Most of the species occur in damp hollows and similar places in upland grassland, on rocky outcrops or in open woodland at altitudes of 3,000 - 12,000 ft., though some species are found in similar habitats down to sea level.

Characteristically of a nondescript tufted habit, both annual and perennial species with rather woody bases occur, but the elongated woody rhizomes typical of Ficinia do not occur. All species have narrow setaceous or filiform leaves, hairy in some species and glabrous in others, but usually with tufts of long hairs at the mouths of the sheaths. The inflorescence may be a solitary dense terminal head with 2 - 3 short subtending bracts, sometimes with 1 - 2 secondary heads arising from the base of the primary one, or it may be umbelliform with 1 or several sessile spikelets at the base and a number of pedicelled solitary ones. The latter form of inflorescence also occurs on plants of similar habit in Fimbristylis and such species can be confused unless the nutlets are carefully examined. The spikelets have numerous spirally arranged glumes of which the lowest 1 - 2 are empty, the succeeding ones are bisexual (with nutlets) and the uppermost are male or sterile. All species have a 3-fid style with the exception of B. humilis in which it is 2-fid. The base of the style is swollen and persists on the maturing nutlet as a dark knob. The nutlet is usually more or less obovoid in shape with a smooth or transversely wrinkled (wavy) surface. More rarely it is longitudinally striate as in Scirpus.

Key to Species

1. Inflorescence a solitary spikelet 2
   Inflorescence a dense head of several spikelets, or umbelliform 4

2. Small tufted annual 3
   Densely tufted perennial with a woody base..... 10. B. zambesica

3. Spikelets 5 mm long, or more ..... 1. B. humilis
   Spikelets 2 - 4 mm long ..... 15. B. glaberrima

4. Heads solitary and dense with sessile spikelets, secondary heads sometimes present 5
   Inflorescence looser, umbelliform, with most of the spikelets pedicelled and solitary 12

5. Nutlets longitudinally ribbed ..... 7. B. schimperiana
   Nutlets smooth or transversely wrinkled 6

6. Spikelets very large, 13 - 18 mm long, light brown and shiny ..... 20. B. aphyllanthoides
   Spikelets not over 12 mm 7

7. Spikelets very acute 8
   Spikelets obtuse or subacute 10

8. Slender annual 4 - 11 ins. high 9
Tufted perennial 9 - 18 ins. high ..... 4. B. cardiocarpa

9. Nutlets transversely wrinkled ..... 2. B. buchananii
Nutlets smooth ..... 3. B. barbata

10. Heads blackish red, up to 20 mm diam. 11
Heads light brown, up to 15 mm diam. ..... 6. B. boeckeleriana

11. Spikelets up to 5 mm long ..... 8. B. trichobasis
Spikelets 5 - 20 mm long .....5. B. atrosanguinea

12. Spikelets large, 5 - 8 mm long 13
Spikelets small, up to 5 mm long 18

13. Plant sparingly hairy all over, especially just below the umbel 15
Plant with glabrous stems 14

14. Nutlets transversely wrinkled ..... 8. B. trichobasis
Nutlets longitudinally striate ..... 9. B. johnstonii

15. Leaves half the length of the stem; spikelets numerous 16
Leaves very short or absent; spikelets few ..... 19. B. transiens

16. Glumes densely pubescent, whitish ..... 17. B. argenteobrunnea
Glumes glabrous, brown 17

17. Glumes dark, an inland species ..... 16. B. coleotricha
Glumes light brown, a coastal species .....
..... 18. B. sp. near B. argenteobrunnea

18. Stems hairy, at least at the tip 19
Stems glabrous throughout 20

19. Stems up to 6 ins. high; inflorescence of 1 - 2 spikelets ..... 13. B. filiformis
Stems 4 - 18 ins. high; inflorescence of numerous spikelets ..... 12. B. holotricha

20. Leaves setaceous .....14. B. densa
Leaves filiform ..... 11. B. abortiva

1. B. humilis Kunth (Fig. 2)
(Including B. striatella C.B.Cl.)
Small leafy glabrous annual 2 - 8 ins. high. Spikelets solitary, occasionally paired, 5 - 8 mm long with light brown, mucronate, green-keeled glumes. Style 2-fid. Nutlet smooth or faintly longitudinally striate. Upland grassland, a weed; 6,000 - 9,000 ft.
KENYA - West Rift Highlands.
TANGANYIKA - Northern Region.

2. B. buchananii C.B.Cl. (Fig. 6)
Slender glabrous annual up to 9 ins. high. Head solitary, dense, 5 - 9 mm diam. Spikelets light brown, 5 - 6 mm long with mucronate glumes. Nutlets finely wrinkled. Grassland, rocky outcrops and open

bush; 2,500 - 6,000 ft.
KENYA - Rift Valley.
TANGANYIKA - Western and Central Regions.

3. B. barbata (Rottb.) C.B.Cl.
Slender glabrous annual up to 9 ins. high. Head solitary, dense, up to 8 mm diam. Spikelets similar to B. buchananii from which it can scarcely be distinguished except by the smooth nutlet. Rocky outcrops, grassland and open bush; sea level - 1,000 ft.
TANGANYIKA - Southern Region and the Coast.
ZANZIBAR - Zanzibar Island.

4. B. cardiocarpa (Ridley) C.B.Cl.
Densely tufted perennial 9 - 18 ins. high with filiform leaves. Heads solitary on glabrous stems, 8 - 12 mm diam. Spikelets 10 - 20, dark brown, 10 mm long with mucronate acute glumes. Nutlets smooth. Grassland, stony hillsides and open woodland; 4,500 - 5,000 ft.
KENYA - Rift Valley.
TANGANYIKA - Lake and Western Regions.
B. filamentosa (Vahl) C.B.Cl., a very similar species with finely hairy stems and different nutlets, is said to occur in East Africa but I have yet to see specimens of it.

5. B. atrosanguinea (Boeck.) C.B.Cl. (Fig. 17)
Densely tufted wiry perennial up to 1½ ft. high with minutely hairy leaves. Head solitary, up to 20 mm diam. with 2 - 20 black spikelets with obtuse glumes. Anthers 2 - 3 mm long. Nutlets faintly wavy. Readily confused with Ficinia. Damp grassland, rocky outcrops etc.; 6,000 - 12,000 ft.
KENYA - Western, Rift Valley and Central Regions.
TANGANYIKA - Northern, Western and Southern Highland Regions.
UGANDA - Buganda, Karamoja.

6. B. boeckeleriana (Schweinf.) A.A. Beetle (Figs. 10, 11, 18)
(B. collina pro parte, B. collina Kunth. var. boeckeleriana (Schweinf.) Chiov., B. zeyheri auctt., B. vaginosa Kukenth.)
Densely tufted perennial up to 1½ ft. high with the stems crowded on a woody rhizome. Heads up to 15 mm diam. solitary or with 1 - 3 smaller lateral pedicelled heads. Spikelets 6 - 8 mm long with light brown green-keeled mucronate glumes. Nutlets wavy. In grassland and on rocky hillocks; 3,500 - 8,000 ft.
KENYA - Widespread on mountains and in upland areas.
TANGANYIKA - Northern, Western and Southern Highland Regions.
UGANDA - Western, Buganda and Eastern Provinces.

7. B. schimperiana (Hochst.) C.B.Cl. (Fig. 16)
Annual or slender tufted perennial 4 - 15 ins. high with setaceous leaves. Heads solitary, up to 10 mm diam. with reddish brown minutely hairy obtuse glumes. Nutlets longitudinally striate and faintly wavy. Damp grassland and shallow soils on rocky outcrops; 3,000 - 5,000 ft.
TANGANYIKA - Lake and Western Regions.
UGANDA - Eastern Province and Buganda.

8. B. trichobasis C.B.Cl.
(B. caespitosa A. Peter)
Slender tufted glabrous perennial 6 - 12 ins. high with bulbous stem-bases closely packed on a short rhizome. Spikelets 3 - 10, shortly pedicelled or sessile, 6 mm long with dark brown or black

pubescent glumes. Nutlets transversely wavy. Seasonally swampy grassland; 3,000 - 7,000 ft.
KENYA - Limuru area.
TANGANYIKA - Western Region and the Usambara Mts.
UGANDA - Western Province and Karamoja.

9. B. johnstonii C.B.Cl.
Slender tufted annual 4 - 10 ins. high. Inflorescence a simple umbel of up to 5 solitary 5 mm long spikelets. Glumes rusty brown, pubescent, often with a few long white hairs. Nutlets almost smooth, faintly lengthwise striate. Damp places in open bush; 4,000 - 6,000 ft.
TANGANYIKA - Kilimanjaro.

10. B. zambesica C.B.Cl.
Slender perennial 4 - 12 ins. high forming very dense tufts. Inflorescence a single large spikelet 8 - 10 mm long with minutely hairy glumes. Nutlets small, smooth or transversely wavy. Upland grassland, swampy places and rocky outcrops; 3,000 - 6,500 ft.
TANGANYIKA - Western, Eastern, Southern Highland and Southern Regions.

11. B. abortiva (Steud.) C.B.Cl.
Slender annual ½ - 2 ft. high with filiform (threadlike) leaves. Inflorescence a simple or compound umbel with numerous spikelets 3 - 5 mm long. Glumes glabrous, light brown. Nutlets faintly transversely wrinkled. In open thicket on stony hillsides; 2,000 - 4,000 ft.
TANGANYIKA - Northern and Western Regions.

12. B. holotricha A.Peter (Fig. 1)
Tufted annual 4 - 18 ins. high with hairy stems, leaves and inflorescence. Inflorescence a compound umbel with pedicelled solitary brown 3 - 4 mm long spikelets with obtuse brown pubescent glumes. Nutlets transversely wrinkled. Very similar to B. abortiva except for the indumentum. Frequent weed, in damp places usually on black cotton soils; 4,000 - 5,000 ft.
KENYA - Central Region and Nairobi.
TANGANYIKA - Western, Central and Southern Regions.

13. B. filiformis C.B.Cl.
Slender pubescent hairy annual 1 - 6 ins. high. Inflorescence of 1 or 2 spikelets 2.5 - 4 mm long with black, green-keeled pubescent glumes. Nutlets faintly transversely wrinkled. Differs from B. densa in hairiness and the fewer larger spikelets. Damp places; sea level - 5,000 ft.
KENYA - Eastern and coastal areas.
UGANDA - Western Province and Karamoja.

14. B. densa (Wall.) Hand.-Mazz. (Fig. 9)
(B. capillaris (L.) C.B.Cl. var. trifida (Nees) C.B.Cl.,
B. trifida (Nees) Nelmes)
Densely tufted slender annual up to 12 ins. high with setaceous leaves. Spikelets in a simple or compound umbel, rarely few, 2 - 3 mm long with pubescent, green-keeled brown glumes. Nutlets smooth or faintly transversely wavy. Rocky outcrops, damp places, grassland; 3,500 - 10,000 ft.
KENYA - Western and Rift Valley Regions.
TANGANYIKA - Northern and Western Regions, the Usambara and Uluguru Mts.
UGANDA - Western and Eastern Provinces.

15. B. glaberrima Kukenth. (Fig. 3)
Slender tufted annual up to 2 ins. high with curving stems and leaves. Inflorescence a single dark brown spikelet 2 - 3.5 mm long. Nutlets smooth. Stream banks in mountain moorland; 10,000 - 12,000 ft.
KENYA - Aberdare Mts.

16. B. coleotricha (A. Rich.) C.B.Cl.
(B. lanifera (Boeck.) A. Peter)
Tufted perennial 6 - 18 ins. high with stems hairy at the top. Umbel of 3 to many spikelets 6 - 8 mm long with dark brown obtuse green-keeled glumes. Nutlets smooth or obscurely wavy. Very like Fimbristylis exilis. Damp places; 2,000 - 6,000 ft.
KENYA - Western, Rift Valley and Central Regions, Nairobi and Masailand.

17. B. argenteobrunnea C.B.Cl.
Slender tufted perennial 6 - 18 ins. high, glabrous or finely pubescent. Inflorescence a pubescent umbel of 5 - 7 mm long spikelets. Glumes very pale 2.5 - 3.5 mm long, mucronate, densely pubescent. Nutlets wavy. Thorn bush and rocky outcrops.
KENYA - Eastern areas.

18. B. species near B. argenteobrunnea C.B.Cl.
Tufted perennial very similar to the above but with darker 7 - 12 mm long spikelets and more sparingly pubescent green-keeled glumes 4 - 5 mm long. Damp places; sea level - 1,500 ft.
KENYA - Coast.
TANGANYIKA - Coast.

19. B. transiens (K.Schum.) C.B.Cl.
Tufted annual similar to B. coleotricha but with very reduced leaves. Spikelets few with pale brown pubescent glumes. Nutlets strongly wrinkled transversely. Sea level - 2,000 ft.
TANGANYIKA - Tanga Region.

20. B. aphyllanthoides (Ridl.) C.B.Cl. (Fig. 19)
Stout tufted leafy perennial 1 - 2½ ft. high. Inflorescence a dense head with 6 - 7 shining brown sessile spikelets 8 - 15 mm long. Glumes 3 - 4 mm long. Nutlets obscurely wavy. Partial shade in bush and plantations; sea level - 4,000 ft.
KENYA - Coast.
TANGANYIKA - Western and Central Regions and the Coast.
ZANZIBAR - Zanzibar Island.

FIMBRISTYLIS Vahl

Fimbristylis is a large genus of pantropical and warm temperate distribution which is especially abundant in Malaysia and Australia. The score or so of species occurring in East Africa show a wide range of habitat, some occur in stony grassland or open bush with species of Bulbostylis of similar habit, while others, stouter in appearance, are found in swamps or on sandy shores over a wide range of altitude.

Both annual and perennial species occur, most of which are tufted with leaves developed at the base of the flowering stems only but one or two are rhizomatous. The species found in the drier habitats have fine setaceous leaves similar to Bulbostylis and an umbellate inflorescence. The swamp and sea-shore species are usually much stouter

with flat linear leaves or leaves reduced to the sheaths only. In most species the inflorescence is a compound umbel, but in a few this is reduced to a solitary spikelet. The majority of species have spikelets with spirally arranged glumes, but in the section Abildgaardia (species 1 and 2), which some authors have treated as a distinct genus, the glumes are distichously arranged, at least in the lower part of the spikelet, and are much larger than normal for the genus and shining. The lowest 1 - 2 glumes are empty, the succeeding ones are bisexual (with nutlets) and the uppermost are male or sterile. The style is 2-fid or 3-fid with an enlarged non-persistent base which is distinct from the nutlet and falls with the style. The nutlets are biconvex or trigonous according to the number of style-arms, with a smooth, transversely wrinkled or warted surface.

Key to Species

1. Spikelets strongly laterally compressed, few; at least the lower glumes distichously arranged 2
   Spikelets not compressed, few or many; glumes spirally arranged 4

2. Spikelets solitary ..... 1. F. monostachyos
   Spikelets several 3

3. Spikelets umbelled ..... 2. F. triflora
   Spikelets in a dense head ..... Bulbostylis aphyllanthoides

4. Inflorescence a solitary spikelet (resembling Eleocharis) ..... 18. F. polytrichoides
   Inflorescence of several spikelets 5

5. Stigmas 2; style flat, often bearded; nutlet biconvex 15
   Stigmas 3; style triquetrous, usually glabrous; nutlet trigonous (a tendency to digyny is found in some species) 6

6. Leaves of the flowering stems (at least the upper ones) reduced to bladeless sheaths, numerous long basal leaves often present 7
   All stem leaves with well developed blades 9

7. Spikelets numerous, 2 - 5 mm long, with obtuse glumes up to 1.5 mm long; leaves filiform, usually short ..... 10. F. miliacea
   Spikelets numerous, usually rather larger with glumes over 2 mm long; leaves flat with a distinct midrib 8

8. Basal leaves well developed; spikelets obtuse; annual .....11. F. quinquangularis
   Stiff perennial with bladeless leaves, or rarely a few narrow rigid ones developed .... 12. F. subaphylla

9. Spikelets always single, never clustered 12
   Spikelets in sessile or pedicelled clusters, a few solitary pedicelled spikelets often present 10

10. Slender annuals; inflorescence a sessile cluster, rarely with 1 or 2 solitary pedicelled spikelets as well 11
Tufted perennial; inflorescence umbellate with pedicelled clusters of spikelets ..... 9. F. obtusifolia

11. Spikelets small, obtuse; glumes black, 1 - 1.5 mm long ..... 6. F. humilis
Spikelets subacute; glumes black with green keels, 2.5 - 3 mm long ..... 8. F. oligostachys

12. Spikelets fewer than 12 in each umbel; leaves filiform or setaceous; stems terete, ridged 13
Spikelets numerous, more than 12 in each umbel; leaves flat; stem compressed at the top, 2-angled ..... 7. F. complanata

13. Spikelets 10 mm long or more at maturity; perennial with bulbous swollen culm-bases clothed with fibrous remnants of old sheaths...4.F. chevalieri
Spikelets 5 - 8 mm long at maturity; culm-bases not swollen 14

14. Spikelets brown, elliptic, 6 - 8 mm long..... 3. F. exilis
Spikelets almost black, subglobose, 5 - 6 mm long ..... 5. F. rotundata

15. Ligules absent; glumes with a conspicuous recurved awnlike mucro ..... 19. F. squarrosa
Ligule a dense fringe of short hairs; glumes without a conspicuous mucro 16

16. Nutlets smooth; leaves reduced to the sheaths or absent 17
Nutlets wrinkled or warted; leaves present 18

17. Glumes grey and minutely pubescent above ..... 14. F. ferruginea
Glumes chestnut, glabrous and smooth ..... 13. F. longiculmis

18. Nutlets longitudinally striate; annual or tufted perennial 19
Nutlets warted; stoloniferous perennial..17. F. madagascariensis

19. Annual; spikelets 1 - 1.5 mm wide .....15. F. bisumbellata
Annual or perennial; spikelets 2 - 4 mm wide... 16. F. dichotoma

1. F. monostachyos (L.) Hassk. (Fig. 40)
(Abildgaardia monostachyos (L.) Vahl)
Tufted leafy perennial 3 - 18 ins. high. Spikelets solitary, 12 mm long with greenish white or yellowish glumes distichous below, spirally arranged above. Style 3-fid. Nutlets faintly warted. Wet grassland, vlei; sea level - 6,500 ft.
KENYA - Widespread and common.
TANGANYIKA - Lake, Tanga and Eastern Regions.
UGANDA - Western and Eastern Provinces.

2. F. triflora (L.) K. Schum. (Fig. 24)
(F. tristachya (Vahl) Thwaites)
Tufted leafy perennial 1 - 2½ ft. high. Spikelets 2 - 5 (rarely only 1), 20 - 25 mm long with pale glumes as in F. monostachya. Style 3-fid. Nutlets large, warted. Swampy grassland and salt marshes; sea level - 1,000 ft.
KENYA - Coast.
TANGANYIKA - Mafia Island and the Coast.
ZANZIBAR - Zanzibar and Pemba Islands.

3. F. exilis (H.B.K.) Roem. & Schult. (Figs. 23, 39)
Hairy tufted annual 4 - 18 ins. high, sometimes almost glabrous. Umbel of 3 - 14 spikelets 6 - 8 mm long with acute pubescent brown green-keeled glumes. Nutlets smooth or faintly wavy or warted. Very like Bulbostylis coleotricha in habit. Open woodland, grassland, damp places and seepage areas on rocky outcrops; sea level - 7,000 ft.
KENYA - Widespread.
TANGANYIKA - Widespread.
UGANDA - Widespread.
ZANZIBAR - Zanzibar Island.

4. F. chevalieri Kukenth.
Slender perennial up to 2 ft. high differing from the above chiefly in the tuberous swollen culm-bases. Spikelets rather larger, minutely hairy or glabrous with faintly wavy nutlets. Seasonally swampy places, rare; 3,000 - 5,000 ft.
TANGANYIKA - Western Region.

5. F. rotundata A. Peter
Sparingly hairy annual 4 - 15 ins. high. Inflorescence of 2 - 5 subglobose spikelets 5 - 6 mm long, 4 - 4.5 mm wide, one sessile, the others shortly pedicelled. Glumes obtuse, dark brown. Style 3-fid. Nutlets faintly warted.
TANGANYIKA - Western Region.

6. F. humilis A. Peter (Fig. 34)
Slender annual 4 - 10 ins. high. Inflorescence a dense 6 - 9 mm diam. cluster of black spikelets. Spikelets obtuse, 4 - 6 mm long, with pubescent, usually green-keeled glumes. Style 3-fid. Nutlets longitudinally striate. Damp places, saline pools, often a weed; 4,000 - 7,000 ft.
KENYA - Western, Rift Valley and Central Regions.
TANGANYIKA - Northern Region.

7. F. complanata (Retz.) Link (Fig. 38)
(Including F. keniaeensis Kukenth.)
Tufted perennial ½ - 2 ft high with rather greyish leaves up to 5 mm wide. Peduncles flattened above and winged. Umbel compound with many solitary brown spikelets 3 - 6 mm long. Style 3-fid. Nutlets faintly wavy or warted. Damp grassland and swamps; 5,000 - 9,000 ft.
KENYA - Western, Rift Valley and Central Regions.
TANGANYIKA - Northern and Tanga Regions.
UGANDA - Western Province.

8. F. oligostachys A.Rich. var. (Fig. 31)
Tufted annual up to 6 ins. high finely hairy throughout. Inflorescence a cluster of 2 - 6 spikelets up to 6 mm long with black, pubescent green-keeled glumes. Style 3-fid. Nutlets transversely wrinkled. Swampy stream banks; 7,000 - 8,000 ft.
KENYA - Western and Rift Valley Regions.
This Kenya form differs from the description of the species merely by being finely hairy throughout.

9. F. obtusifolia (Lam.) Kunth (Fig. 30)
Glabrous perennial 4 - 18 ins. high, rather stout. Umbel compound with small pedunculate clusters of 3 - 5 mm long spikelets with whitish obtuse glumes. Style 3-fid. Nutlets smooth and dark. Sandy shores and salt marshes; sea level.
KENYA and TANGANYIKA - Coast.
ZANZIBAR - Zanzibar Island.

10. F. miliacea (L.) Vahl (Fig. 25)
Tufted leafy annual ½ - 2 ft high usually with very short leaves. Umbel compound with numerous pedicellate globose or shortly cylindric 2 mm long spikelets. Style 3-fid. Nutlets faintly warted or wavy. Swampy grassland; sea level - 1,000 ft.
TANGANYIKA - Coast.
ZANZIBAR - Zanzibar Island.

11. F. quinquangularis (Vahl) Kunth
Glabrous annual similar to the above but with broader, often very short leaves. Umbel compound with numerous pedicellate spikelets 3 - 5 mm long. Style 3-fid. Nutlets faintly wavy or warted.
TANGANYIKA - Lake Region.

12. F. subaphylla Boeck.
Tufted glabrous perennial with leaf-blades very short or absent. Umbels compound, very similar to F. complanata with brown ellipsoid obtuse spikelets 4 - 8 mm long. Style 3-fid. Nutlets smooth or warted, rarely wavy. In swamps; 3,000 - 4,000 ft.
UGANDA - Buganda.

13. F. longiculmis Steud. (Fig. 22)
Tufted leafless perennial 2 - 4 ft high. Umbels compound with numerous brown obtuse glabrous spikelets 10 - 20 mm long. Styles 2-fid. Nutlets smooth. Very similar to F. ferruginea. Swamps and sea shore; sea level.
TANGANYIKA - Mafia Island and the Coast.
ZANZIBAR - Zanzibar Island.

14. F. ferruginea (L.) Vahl
Tufted perennial 3 - 5 ft high with greyish leaves often reduced to the sheaths only and culms compressed towards the tip. Umbels compound with numerous brownish spikelets 10 - 20 mm long differing from F. longiculmis only in the greyish pubescence on the back of the glumes. Styles 2-fid. Nutlets smooth. Sandy beaches; sea level.
KENYA - Coast.
TANGANYIKA - Coast.
ZANZIBAR - Zanzibar Island.

15. F. bisumbellata (Forsk.) Bub.
Tufted leafy annual 4 - 10 ins. high with greyish pubescent leaves. Umbel compound with numerous 3 - 5 mm long spikelets. Style 2-fid. Nutlets longitudinally striate. Sandy places on river banks; sea level - 3,000 ft.
KENYA - Central Region.
TANGANYIKA - Tanga, Central and Southern Regions.

16. F. dichotoma (L.) Vahl (Fig. 28)
(F. diphylla (Retz.) Vahl)
Tufted perennial or annual ½ - 2½ ft high with greyish often pubescent leaves. Umbels compound with numerous spikelets on a compressed but not winged peduncle. Spikelets up to 10 mm long, brown.

Style 2-fid. Nutlets longitudinally striate. River banks, forests, swamps etc.; sea level - 5,500 ft.
KENYA - Widespread.
TANGANYIKA - Widespread.
UGANDA - Widespread.
ZANZIBAR - Zanzibar Island.

17. F. madagascariensis Boeck. (Fig. 24)
(F. dichotoma pro parte)
Stoloniferous perennial up to 2½ ft high differing from the above only in the presence of stolons, the slightly larger spikelets and the warted nutlets. Swampy grassland; 3,000 - 7,000 ft.
KENYA - Nairobi.
TANGANYIKA - Lake and Western Regions.

18. F. polytrichoides R.Br.
Tufted glabrous leafy perennial 6 - 15 ins. high. Spikelets solitary, with pale obtuse glumes. Style 2-fid. Nutlets smooth. Sandy places, sometimes a weed; sea level - 4,000 ft.
KENYA - Coast.
TANGANYIKA - Lake Region and the Coast.
ZANZIBAR - Zanzibar Island.

19. F. squarrosa (Poir.) Vahl (Figs. 35, 36)
Slender leafy annual 2 - 8 ins. high. Umbel compound with small straw-coloured spikelets, the glumes with a strongly recurved mucro. Style 2-fid with slender processes descending from its base and surrounding the smooth nutlet. This species has the habit of a small Mariscus or Cyperus but the glumes are spirally arranged and the spikelets are not compressed. Swamps and damp grassland; sea level - 4,000 ft.
TANGANYIKA - Lake Region and the Coast.

SCIRPUS L.

Scirpus is a large, ill-defined genus with a world-wide distribution. Only a limited number of species are to be found in tropical East Africa in damp places, swamps and rivers over a wide range of altitude.

There is a wide range of habit among the annual and perennial species recorded here. Some have leafy stems (S. fluitans), some have the leaves restricted to the base of the stems and in yet others the leaves are reduced to the sheaths only. With the exception of S. fluitans all have conspicuous bracts subtending a terminal inflorescence which in the sections Isolepis (species 3 - 8) and Scirpus (species 9 - 17) are solitary, erect, and appear to be a continuation of the stem with the inflorescence appearing lateral. In most of the remaining species the bracts are usually leaflike and more numerous. The inflorescence is usually umbelliform, but it may be contracted into a dense head, while in a few species it is reduced to a solitary spikelet. The spikelets have spirally arranged glumes of which the lowest 0 - 2 are empty, the succeeding ones bisexual (with nutlets) and the uppermost male or sterile. Hypogynous bristles may be absent, linear-scabrid or plumose (S. littoralis). The style is 2-fid or 3-fid and passes gradually into the nutlet. The nutlets, which are trigonous or biconvex according to the number of style arms, may have a smooth, transversely wrinkled or longitudinally striate surface.

Key to Species

1. Inflorescence a solitary dense head or a single spikelet 2
   Inflorescence a compound umbel 18

2. Plants leafy 3
   Plants leafless, the leaves reduced to sheaths only 10

3. Spikelets 1 - 4, usually solitary 5
   Spikelets numerous in a single head, not distinct 4

4. Heads white, up to 5 mm diam. ..... 19. S. microcephalus
   Heads greenish, 6 - 10 mm diam. ..... 18. S. steudneri

5. Stems many-noded, creeping; spikelets solitary ... 3. S. fluitans
   Stems without nodes, erect 6

6. Spikelets 1 - 3 mm long; glumes not over 1 mm long 8
   Spikelets 2 - 3.5 mm long; glumes 1.2 - 2.5 mm long 7

7. Spikelets solitary or paired; annual 1 - 6 ins. high ..... 4. S. setaceus
   Spikelets clustered, 2 - 4; perennial 6 - 10 ins. high ..... 7. S. trollii

8. Spikelets solitary, apparently lateral, with a long erect bract ..... 6. S. isolepis
   Spikelets 2 - 4 in a terminal head 9

9. Bracts 1 - 3, scarcely longer than the spikelets; glumes mucronate ..... 5. S. sp. near S.isolepis
   Bracts long; glumes aristate ..... 20. S. lugardii

10. Stems triangular in section ..... 11. S. mucronatus
    Stems terete 11

11. Nutlets longitudinally striate and wavy 12
    Nutlets smooth or transversely wrinkled 13

12. Stems 0.7 - 1 mm diam.; heads 7 - 10 mm diam ..... 8. S. costatus var. costatus
    Stem up to 0.5 mm diam.; heads 4 - 6 mm diam ..... 8. S. costatus var. macer

13. Spikelets small, up to 4 mm long ..... 12. S. tenerrimus
    Spikelets over 4 mm long 14

14. Spikelets very obtuse, lanceolate, with glume margins usually inrolled; culms transversely septate 15
    Spikelets linear, glumes not incurved; culms not septate 16

15. Spikelets 6 - 8 mm long, greenish yellow..... 9. S. praelongatus
    Spikelets 10 - 12 mm long, streaked with red or brown ..... 10. S. articulatus

16. Nutlets strongly transversely wrinkled 17
Nutlets smooth or faintly wavy ..... 13. S. roylei

17. Annual; spikelets 5 - 6 mm long, glumes 2.5 - 3 mm long..... 14. S. supinus
Perennial; spikelets 5 - 12 mm long; glumes 2.5 - 4.5 mm long..... 15. S. confusus

18. Stems triangular with acute angles 19
Stems terete, sometimes faintly angled at the top 20

19. Spikelets crowded in dense spherical heads 10 - 15 mm wide ..... 1. S. cubensis
Spikelets linear-lanceolate, 10 - 35 mm long.... 2. S. maritimus

20. Spikelets cylindric-linear, 10 - 35 mm long .... 17. S. littoralis var. pterolepis
Spikelets up to 10 mm long 20

21. Umbel compound; nutlets smooth or faintly wavy; bracts shorter than the inflorescence ..... 16. S. inclinatus
Umbels contracted with very short branches; nutlets strongly wrinkled; bracts much longer than the inflorescence ..... 15. S. confusus

1. S. cubensis Kunth (Figs. 44, 55)
Tufted leafy perennial up to 2 ft high. Inflorescence of dense round pedunculate heads. Spikelets 4 - 8 mm long with acute, ciliate-margined green glumes. Style 2-fid. Nutlets smooth, beaked. Stream banks, and swamps; sea level - 4,000 ft.
TANGANYIKA - Mafia Island.
UGANDA - Buganda.

2. S. maritimus L. (Fig. 43)
Glabrous leafy perennial 1 - 4 ft high. Inflorescence of ovate or linear spikelets with golden-brown long-mucronate glumes. Style 2-fid or 3-fid. Nutlets smooth or faintly reticulate. Seasonal pools, river banks, rice fields; sea level - 5,500 ft.
KENYA - Central Region and the Coast.
TANGANYIKA - Northern, Central, Tanga Regions and the Coast.

3. S. fluitans L.
Creeping leafy herb with many-noded stems often rooting from the nodes. Inflorescence a solitary green spikelet 3 - 4 mm long. Style 2-fid. Nutlets smooth. Damp grassland, swampy places and pools; 4,000 - 14,000 ft.
KENYA - Western, Rift Valley and Central Regions.
TANGANYIKA - Lake, Northern, Tanga and Southern Regions.
UGANDA - Western and Eastern Provinces.

4. S. setaceus L. (Fig. 46)
Slender leafy annual 1 - 6 ins. high with solitary or clustered lateral spikelets 2 - 5 mm long. Style 3-fid. Nutlets longitudinally striate. There is a marked similarity with Bulbostylis but that genus never has lateral inflorescences. Swamps and stream banks; 9,000 - 12,000 ft.
KENYA - Western, Rift Valley and Central Regions.
TANGANYIKA - Northern Region.
UGANDA - Western Province.

5. S. species near S. isolepis (Nees) Boeck.
Slender annual 1 - 6 ins. high with short leaves, and a solitary lateral head of 2 - 3 spikelets. Spikelets 1 - 2.5 mm long with dark obtuse glumes. Style 3-fid. Nutlets smooth. Damp grassland and swampy places; 6,000 - 8,000 ft.
KENYA - Central Region.
TANGANYIKA - Southern Highlands Region.

6. S. isolepis (Nees) Boeck. (Fig. 52)
(Lipocarpha monocephala Turrill)
Very slender leafy annual 1½ - 6 ins. high with solitary lateral spikelets 2 - 3 mm long. Glumes purple, obtuse. Style 2-fid. Nutlets smooth. Of similar habit to Lipocarpha monostachya but lacks the awns. Swampy grassland; 5,000 - 7,500 ft.
KENYA - Western Region.
TANGANYIKA - Western and Central Region.

7. S. trollii Kukenth.
Tufted leafy perennial with lateral heads. Bract 20 - 50 mm long. Spikelets dark brown, 2.5 - 4 mm long, in sessile clusters of 2 - 4. Style 3-fid. Nutlets smooth. On mist forest edges, rare; 7,000 - 8,000 ft.
TANGANYIKA - Uluguru Mts.

8. S. costatus Boeck. var. costatus (Figs. 45, 47)
Slender shortly rhizomatous leafless perennial up to 2 ft high. Bracts short. Heads terminal, 7 - 10 mm diam. with few obtuse 3 - 6 mm long spikelets. Style 3-fid. Nutlets longitudinally striate and wavy. Mountains, bogs and swamps; 6,000 - 11,500 ft.
KENYA - Western, Rift Valley and Central Regions.
TANGANYIKA - Northern, Tanga and Southern Regions.
UGANDA - Western Province.

var. macer (Boeck.) Cherm.
Differs from the above only in being more slender, not over 18 ins. high. Swamps, stream banks and Sphagnum bogs; 7,000 - 10,000 ft.
KENYA - Western, Rift Valley and Central Regions.
TANGANYIKA - Widespread but not common.
UGANDA - Western Region.

9. S. praelongatus Poir. (Fig. 50)
Tufted leafless annual 1 - 2 ft high with terete septate stems, but the septa are rarely conspicuous. Inflorescence a lateral cluster of subobtuse golden spikelets borne about ⅓ of the way up the stem. Spikelets 4 - 6 mm long. Style 3-fid. Nutlets wavy. Seasonally swampy places; sea level - 4,000 ft.
KENYA - Widespread but uncommon.
TANGANYIKA - Western Region.
UGANDA - Western Province.

10. S. articulatus L.
Tufted leafless perennial 1 - 3 ft. high with stout septate stems. Spikelets in a lateral cluster, obtuse or subacute, pale or brownish, 6 - 15 mm long. Style 3-fid. Nutlets smooth or wavy. Pools, ditches and swamps; sea level - 3,500 ft.
KENYA - Coast.
TANGANYIKA - Lake Region, Coast.
UGANDA - Western and Eastern Provinces.
ZANZIBAR - Pemba and Zanzibar Islands.

11. S. mucronatus L. (Fig. 56)
Tufted leafless perennial up to 2½ ft high with stout triangular stems. Spikelets 10 mm long or more, in a lateral cluster. Styles 3-fid. Nutlets smooth or faintly wavy. Pools and swamps; 3,000 - 4,000 ft.
TANGANYIKA - Lake Regions.

12. S. tenerrimus A. Peter
Tufted leafless annual 6 - 12 ins. high very similar to S. costatus var. macer but having pale sheaths and glumes, a terminal bract 2 - 6 ins. long, and a strongly transversely wrinkled nutlet. Damp places 3,500 - 4,500 ft.
TANGANYIKA - Western Region.

13. S. roylei (Nees) A.A. Beetle (Fig. 49)
(Isolepis lupulina Wight, S. quinquefarius Boeck.)
Leafless tufted perennial 1 - 2 ft high. Inflorescence a lateral cluster of golden spikelets up to 8 mm long with spreading glumes. Style 3-fid. Nutlets smooth. Damp places; sea level - 5,000 ft.
KENYA - Central Region.
TANGANYIKA - Coast.

14. S. supinus L.
Leafless tufted annual up to 12 ins. high Spikelets 4 - 12 mm long in a lateral cluster, with green-keeled glumes. Style 3-fid. Nutlets strongly transversely wrinkled. Similar to S. confusus but more slender. Swampy places and rice fields; 1,000 - 4,000 ft.
TANGANYIKA - Northern Region.

15. S. confusus N.E.Br. (Fig. 48)
(S. supinus var. uninodis in Fl. Trop. Afr. partly, S. corymbosus var. junciformis A. Peter)
Tufted perennial 1 - 3 ft high. Inflorescence bract much longer than the inflorescence. Spikelets in shortly pedunculate umbels or sessile clusters, 5 - 12 mm long. Style 3-fid. Nutlets strongly transversely wrinkled. Swamps; 1,000 - 5,000 ft.
KENYA - Widespread but not very common.
TANGANYIKA - Northern, Central, Southern Highland and Southern Regions.
UGANDA - Western Province, Buganda and Karamoja.
ZANZIBAR - Zanzibar Island.

16. S. inclinatus (Del.) Aschers. & Schweinf. (Fig. 54)
(S. corymbosus auctt., S. corymbosus var. brachyceras (A. Rich.) Schweinf., S. brachyceras A. Rich.)
Stout-stemmed leafless perennial 1 - 8 ft high. Inflorescence bracts shorter than the inflorescence, rarely over 2½ ins. long. Inflorescence umbelliform with pedunculate and sessile clusters of 4 - 7 mm long spikelets. Style 3-fid. Nutlets smooth or faintly wavy. Swamps, rivers and lakes; 2,000 - 8,000 ft.
KENYA - Widespread.
TANGANYIKA - Widespread.
UGANDA - Western and Eastern Provinces.
The differences between S. inclinatus and S. brachyceras are so slight that there are inadequate grounds for maintaining them as distinct species.

17. S. littoralis Schrad. var. pterolepis (Kunth) C.B.Cl.
(Frequently confused with S. subulatus Vahl from which it may not be distinct).
Glabrous perennial 2 - 7 ft high, usually leafless. Stems stout, terete or triangular at the top. Umbel compound with numerous pedicelled subcylindric spikelets 10 - 12 mm long. Hypogynous bristles plumose. Style 2-fid. Nutlets smooth. Swamps, rivers and lake shores; 3,000 - 5,500 ft.
KENYA - Western Region.
TANGANYIKA - Lake and Southern Highland Regions.

18. S. steudneri Boeck. (Fig. 53)
Slender leafy glabrous perennial surrounded at the base by fibrous sheath remnants. Heads terminal with several leafy bracts, 6 - 10 mm wide, with numerous greenish spikelets. Glumes with recurved mucros. Styles 3-fid. Nutlets smooth. Easily mistaken for Kyllinga. Swampy places; 2,000 - 5,000 ft.
KENYA - Central and Northeastern Regions, Nairobi and the Coast.
TANGANYIKA - Lake, Central, Eastern and Southern Highland Regions.
UGANDA - Karamoja.

19. S. microcephalus (Steud.) Dandy
Tufted perennial 1 - 6 ins. high similar to the above but more slender. Heads terminal, minute, white. Style 3-fid. Nutlets smooth. Damp places; sea level - 1,000 ft.
KENYA - Mombasa.
ZANZIBAR - Zanzibar Island.

20. S. lugardii C.B.Cl.
Slender leafy annual 1 - 4 ins. high. Inflorescence a dense compound terminal head 12 mm diam., rarely umbellate. Spikelets up to 3 mm long, dark. Glumes with long recurving mucros. Style 3-fid. Nutlets smooth. Damp places; 3,000 - 4,000 ft.
TANGANYIKA - Western and Central Regions.

ELEOCHARIS R..Br.

Eleocharis (sometimes spelt Heleocharis) is a large genus of world wide distribution which is especially abundant in America. Only a few species occur in Eastern Africa. Though usually to be found in fresh water at the edges of lakes, dams, rivers etc. there is also one species occurring in the salt waters of mangrove swamps.

All are leafless glabrous erect herbs with a solitary terminal spikelet, but the habit varies from very slender annuals scarcely 2 ins. high to stout rhizomatous perennials 3 - 4 ft high. The spikelet is without a long subtending bract and has numerous spirally arranged glumes of which the lower ones are sometimes distichous as in Fimbristylis monostachyos. As in the other genera of this group, the lower glumes are empty, the succeeding ones are bisexual (with nutlets) and the uppermost are staminate or empty. The hypogynous bristles are present in some species but their occurrence and development is not constant and is of no value in a practical classification. The styles may be 2-fid or 3-fid. In some species this is constant but in others, especially the stout ones, it is variable. The style-base is enlarged and persistent as in Bulbostylis. The nutlets are biconvex or trigonous according to the number of style arms and their surface is smooth, longitudinally striate or transversely wavy.

Key to Species

1. Glumes not keeled, or scarcely so, 3 - 8 mm long; spikelets over 10 mm long; stout-stemmed perennials 2
   Glumes conspicuously keeled, 1 - 3 mm long; spikelets less than 10 mm long; annuals or perennials, but slender 5

2. Nutlets smooth 3
   Nutlets longitudinally striate and transversely wavy 4

3. Stems terete, with a few transverse septa conspicuous in the dried state ..... 1. E. dulcis
   Stems without septa, compressed above and sometimes keeled, but not winged ..... 4. E. marginulata

4. Stems rounded or subtriangular ..... 3. E. variegata
   Stems trigonous, the angles very acute ..... 2. E. acutangula

5. Stems compressed, sharply 2-keeled ..... 6. E. complanata
   Stems terete or quadrangular 6

6. Spikelets lanceolate or elliptic, 1 - 2 mm wide 7
   Spikelets ovoid or broadly triangular, 3 - 4 mm wide ..... 10. E. caribaea

7. Spikelets tinged with red or purple 8
   Spikelets golden-yellow or brown ..... 5. E. nigrescens

8. Very slender-culmed annual up to 3½ ins. high with pale sheath-bases; spikelets not over 2 mm long ..... 8. E. brainii
   Slender-culmed annual 2½ - 6 ins. high with reddish sheath-bases; spikelets 2 - 5 mm long 9

9. Glumes obtuse ..... 9. E. atropurpurea
   Glumes acute ..... 7. E. retroflexa

1. E. dulcis (Burm.f.) Trin. (Fig. 26)
   (E. plantaginea (Retz.) Roem. & Schult.)
   Stout stoloniferous perennial 1 - 4 ft high with terete stems. Spikelet 25 - 50 mm long, pale green. Glumes rounded, often edged with brown. Style 2- or 3-fid. Nutlets smooth. Seasonally flooded pans, lake shores etc.; 3,500 - 5,000 ft.
KENYA - Central Region.
TANGANYIKA - Northern and Southern Regions.
UGANDA - Sese Islands.

2. E. acutangula (Roxb.) Schult. (Figs. 29, 32, 41)
   (E. fistulosa auctt.)
   Stout stolonoferous perennial 1 - 3 ft. high. Spikelets 20 - 40 mm long with pale green glumes. Style 2- or 3-fid. Nutlets faintly longitudinally striate. Swamps, lakes and permanent water; sea level - 5,000 ft.
KENYA - Western and Central Regions.
TANGANYIKA - Lake, Northern, Western and Central Regions.
UGANDA - Western Province.
ZANZIBAR - Pemba Island.

3. E. variegata (Poir.) Presl
Stoloniferous perennial 1 - 2 ft high. Spikelets 20 - 30 mm long with pale green hyaline-margined glumes edged with brown. Style 2- or 3-fid. Nutlets longitudinally striate. Swamps, streams, and lake shores; 2,500 - 4,000 ft.
TANGANYIKA - Western and Southern Regions.
UGANDA - Buganda.

4. E. marginulata Steud.
Stoloniferous perennial 1 - 2 ft high with slender subterete culms. Spikelet lanceolate, 10 - 15 mm long with dark brown glumes. Style 3-fid. Nutlets smooth. Marshy meadows, swamps, ditches; 5,000 - 8,000 ft.
KENYA - Rift Valley and Central Regions.
TANGANYIKA - Usambara Mts..
UGANDA - Western Province.

5. E. nigrescens (Nees) Steud.
(E. hildebrandtii Boeck.)
Slender tufted annual 2 - 9 ins high with quadrangular stems. Spikelets rather small, 2 - 5 mm long with pale yellowish or light brown glumes. Style 3-fid. Nutlets smooth. Swamps and shallow water; sea level - 4,500 ft.
TANGANYIKA - Western and Central Regions.
ZANZIBAR - Zanzibar Island.

6. E. complanata Boeck. (Fig. 27)
Tufted annual 2 - 5 ins. high with rather wide, flattened stems. Spikelets 4 - 10 mm long with obtuse purple glumes with broad white margins. Style 3-fid. Nutlets smooth. Spikelets similar to E. atropurpurea. Seasonally wet places; 2,000 - 3,000 ft.
TANGANYIKA - Western Region.

7. E. retroflexa (Poir.) Urban
Tufted annual 2 - 4 ins. high. Spikelet 3 - 3.5 mm long with acute glumes more like those of Fimbristylis than the other species of Eleocharis. Style 3-fid. Nutlets not seen. Lake shores; 4,000 - 5,000 ft.
TANGANYIKA - Western Region.

8. E. brainii Svenson
Slender tufted annual 1 - 5 ins. high. Spikelet 1 - 3 mm long. Glumes pale but with dark patches on the sides. Style 3-fid. Nutlets longitudinally striate. Partially or wholly submerged in swampy places; 3,000 - 4,000 ft.
TANGANYIKA - Southern Region.

9. E. atropurpurea (Retz.) Presl (Fig. 37)
(Including the doubtfully distinct E. tenerrima A. Peter)
Slender tufted annual 2 - 6 ins. high. Spikelets ovoid or cylindric, 3 - 6 mm long with purplish-green obtuse glumes. Style 2-fid. Nutlets smooth. Swampy places, seepage zones on rocky outcrops, etc.; sea level - 5,500 ft.
KENYA - Central Region and Nairobi.
TANGANYIKA - Widespread but uncommon.

10. E. caribaea (Rottb.) Blake. (Fig. 33)
(E. capitata R.Br.)
Stout annual 2 - 9 ins. high, but occasionally up to over 1 ft. Spikelet ovoid, 2.5 - 6 mm long with greenish-red obtuse glumes. Style 2-fid. Nutlets smooth. Among mangrove roots, in river deltas; sea level.
TANGANYIKA - Coast and Mafia Island.
ZANZIBAR - Pemba Island.

FUIRENA Rottb.

Fuirena is a small genus occurring in the warmer countries only. There are ten species recorded from East Africa and these occur in most moist habitats, seasonally flooded grasslands, pools, swamps and lake shores at all altitudes from sea level to about 7,000 ft.

Both annual and perennials are likely to be found. All are with nodose triangular leafy stems, and spikelets akin to Scirpus, in which a number of authors include the genus. The inflorescence is usually corymbose paniculate, but sometimes it is contracted. The spikelets have numerous spirally arranged glumes, but in a few species these are 5-ranked and the spikelets are angular in section. Usually the glumes are grey-green, pubescent, with a long terminal recurved bristle, but in some the bristles are straight or absent and the glumes more glabrous and brownish-green. Hypogynous bristles and scales are usually present, linear, and somewhat variable, even to being absent in the section Hemiscirpus (species 1 - 5). But in others, in the section Fuirena (species 6 - 10), the three inner ones have a broad, very characteristically shaped lamina. The style is 3-fid, linear, with an enlarged base which persists on the nutlet as in Bulbostylis, more rarely this is minute. The nutlets are trigonous, obovoid, with a smooth or transversely wrinkled surface, usually black at maturity but in a few species they are greenish.

Key to Species

1. Spikelets very large, up to 20 mm long and 6 mm wide..... ..... 5. F. pachyrrhiza
Spikelets not over 12 mm long and 5 mm wide 2

2. Perennials; leaves very wide, 10 - 30 mm 3
Annuals or perennials; leaves up to 9 mm wide 4

3. Sheaths and stems acutely angled ..... 10. F. umbellata
Sheaths and stems not angled ..... 9. F. calolepis

4. Glumes with a long bristle, usually recurved 5
Glumes with a short straight mucro 8

5. Annuals 6
Perennial ..... 4. F. pubescens

6. Glumes brown with a green keel excurrent into a straight bristle ..... 3. F. abnormalis
Glumes grey-green, often dark, bristles recurving 7

7. Spikelets 8 - 12 mm long and 3 - 4 mm wide ..... 6. F. ciliaris
   Spikelets 6 - 8 mm long; and 1.5 - 2.5 mm wide .....
   ..... 8. F. leptostachya

8. Spikelets angular, with 5-ranked glumes ..... 1. F. stricta
   Spikelets not angular, terete 9

9. Spikelets linear, 2 - 3 mm wide; perennial .... 2. F. chlorocarpa
   Spikelets 3 - 4 mm wide, ovate-elliptic; annual .....
   ..... 7. F. claviseta

1. F. stricta Steud. (Fig. 14)
Rhizomatous or tufted perennial, 6 - 15 ins. high with short linear leaves. Spikelets 12 mm long, 3 mm wide, in terminal and lateral clusters of 1 - 4. Glumes green or brown with a green keel. Hypogynous bristles linear. Nutlets brownish green at maturity. Only differs from F. chlorocarpa in the angled spikelets. Swamps; 2,500 - 6,500 ft.
KENYA - Western Region.
TANGANYIKA - Southern Highlands Region.
UGANDA - Western Province and Buganda.

2. F. chlorocarpa Ridl.
Stoloniferous perennial 12 - 18 ins. high with short linear leaves. Inflorescence of terminal and lateral clusters of 2 - 4 spikelets with acute grey-green glumes. Nutlets similar to F.stricta but greener. Damp and swampy places; 3,000 - 7,000 ft.
KENYA - Widespread but not common.
TANGANYIKA - Northern, Western and Southern Highland Regions.

3. F. abnormalis C.B.Cl. (Fig. 20)
Leafy annual up to 1½ ft high. Inflorescence corymbose, with 2 or more lateral corymbs at each node. Spikelets 4 - 7 mm long with glabrous light brown glumes. Hypogynous bristles absent. Nutlets smooth or faintly wavy. Pools, ditches and swamps; 3,000 - 6,000 ft.
TANGANYIKA - Southern Highlands and Southern Region.

4. F. pubescens Kunth
Rhizomatous perennial up to 2½ ft high. Spikelets broadly ellipsoid, 6 - 10 mm long in corymbose clusters or panicles. Glumes grey-green with a recurved mucro. Bristles absent. Nutlets small, smooth. Swamps and swampy places; sea level - 7,000 ft.
KENYA - Widespread and fairly common.
TANGANYIKA - Lake, Northern and Central Regions.
UGANDA - Western Province and Buganda.
ZANZIBAR - Zanzibar Island.

5. F. pachyrrhiza Ridl.
Rhizomatous perennial 1 - 3 ft high. Spikelets up to 20 mm long with long-mucronate grey-green glumes 3 - 4 mm long. Bristles absent. Nutlets small, smooth. Lake shores and swampy places; 3,000 - 5,000 ft.
KENYA - Western, Rift Valley, North-eastern Regions and Nairobi.
TANGANYIKA - Widespread except in the extreme south.
UGANDA - Eastern Province.

6. F. ciliaris (L.) Roxb. (Fig. 5)
(F. glomerata Lam.)
Hairy annual 4 - 18 ins. high. Panicle oblong with a few close clusters of dark green or brown spikelets 8 - 12 mm long, 3 - 4 mm wide.

Glumes with a long mucro. Hypogynous scales as long as the nutlet, the inner 3 with a broad blade on a long claw. Nutlets smooth. Swampy places, stream banks and pools; sea level - 5,000 ft.
KENYA - Central Region and the Coast.
TANGANYIKA - Widespread.

var. angolensis Schinz
This is scarcely distinguishable from the above except by the crescent-shaped blade of the hypogynous scale. Swampy places and pools; 3,000 - 4,000 ft.
TANGANYIKA - Lake and Central Regions.

7. F. claviseta A. Peter (Fig. 8)
Annual 6 - 18 ins. high closely resembling F. ciliaris except for the emucronate glumes and the swollen, veinless, tailed lamina of the inner clawed hypogynous scales. Damp places; sea level.
ZANZIBAR - Zanzibar Island.

Some gatherings of this species have been named F. seriata C.B.Cl., but this appears to be a synonym of F. umbellata. I have used the only name of which I am aware that is correctly applied to this species, though this may not prove to be the earliest name available.

8. F. leptostachya Oliv. (Fig. 4)
Tufted hairy annual 6 - 18 ins. high, differing from F. ciliaris in the slighter habit, the smaller spikelets and hypogynous scales with a crescent-shaped, not squarish, lamina. Swamps and lake shores; 1,500 - 5,500 ft.
KENYA - Widespread, locally abundant.
TANGANYIKA - Widespread.
UGANDA - Buganda.

9. F. calolepis K. Schum. (Figs. 7, 21)
(F. cinerascens Boj. ex C.B.Cl.)
Pubescent perennial up to 18 ins. high with a stout creeping rhizome. Inflorescence dense, with numerous 6 - 12 mm long, grey-green spikelets. Inner hypogynous scales as long as the nutlet with a crested laterally winged blade and a ciliate claw. Nutlets smooth. Damp places; sea level - 500 ft.
KENYA - Coast.
TANGANYIKA - Coast.
ZANZIBAR - Zanzibar and Pemba Islands.

10. F.umbellata Rottb. (Fig. 15)
(F. multiflora A. Peter, F. appendiculata A. Peter)
Stout perennial up to 5 ft high. Panicle large with numerous 6 - 10 mm long spikelets in dense umbels. Glumes green or brownish with a recurved bristle. Inner hypogynous scales laminate, similar to F. ciliaris but lacking the long claw. Nutlets smooth. Swamps, stream banks and pools; sea level - 4,000 ft.
KENYA - Western Region and the Coast.
TANGANYIKA - Widespread, including Mafia Island.
UGANDA - Eastern Province and Buganda.
ZANZIBAR - Zanzibar Island.

LIPOCARPHA R. Br.

Lipocarpha is a small genus of under 20 species which occur in the warmer parts of both hemispheres. Only 4 have been recorded in tropical east Africa where they can be found over a wide range of altitude in seasonally flooded grassland, swamps and river beds and, more rarely, in seepage zones on rocky outcrops.

The habit is varied. Slender annuals and stout tufted perennials occur but all have glabrous basal leaves and nodeless stems. The inflorescence is a solitary terminal head with several leafy bracts, sometimes, as in Scirpus, reduced to a solitary pseudolateral spikelet with a single erect bract. The spikelets have numerous closely packed spirally arranged glumes of which the lowest 2 are empty, the succeeding ones are bisexual (having nutlets) and deciduous in fruit, leaving the naked rhachilla, and the uppermost male or sterile. Within the glumes there are 2 elliptic or obovate scales surrounding the nutlet. The nature of these is obscure and has given rise to several differing theories but the most acceptable, considering the other resemblances to Scirpus, is that these scales have originated in the fusion of the hypogynous scales. The style is small, 3-fid or 2-fid without a swollen and persistent base. The nutlets are more or less trigonous or biconvex, obovoid or oblong, and smooth.

Key to Species

1. Glumes acuminate, or with a long recurved awn; spikelets solitary or several in a dense head 2
   Glumes obtuse; spikelets several in a dense head ..... 1. L. chinensis

2. Spikelets solitary ..... 4. L. monostachya
   Spikelets several in a dense head 3

3. Stoloniferous perennial ½ - 2 ft high ..... 2. L. albiceps
   Slender annual 3 - 12 ins. high ..... 3. L. pulcherrima

1. L. chinensis (Osb.) Kern (Fig. 51)
   (L. senegalensis (Lam.) Th. & Hel. Dur., L. argentea (Vahl) R.Br.)
   Tufted perennial 1 - 2½ ft high with leaves in a basal tuft. Heads white, 15 - 25 mm diam. of 2 - several spikelets with 1 - 2 spreading basal bracts. Swamps, river banks; sea level - 6,000 ft.
KENYA - Western, Rift Valley and Central Provinces.
TANGANYIKA - Widespread.
UGANDA - Eastern Province, Buganda and the Sese Islands.
ZANZIBAR - Zanzibar Island.

2. L. albiceps Ridl.
   Rhizomatous perennial 1 - 2 ft high with terete stems. Heads 10 - 20 mm diam. of 3 dense spikelets with 2 - 3 short spreading bracts. Glumes dark red below, white above. River banks, swamps, damp places; 3,000 - 4,000 ft.
TANGANYIKA - Western Region.
UGANDA - Western Province.

3. L. pulcherrima Ridl.
Slender annual 4 - 10 ins. high with a terminal head of 3 spikelets. Spikelets 3.5 - 4.5 mm long with blackish red glumes with a conspicuous recurved green mucro. Seepage zones on rocks, swampy grassland, swamps; 1,000 - 8,000 ft.
KENYA - Nairobi.
TANGANYIKA - Lake, Northern, Tanga and Western Provinces.
UGANDA - Buganda.

4. L. monostachya R. Gross & Mattf.
Slender annual 2 - 4 ins. high with few fine leaves. Spikelets 4 mm long with dark red glumes with a long recurved mucro. Seasonally wet places; 1,500 - 4,000 ft.
TANGANYIKA - Western, Central and Southern Regions.

Of similar habit to Scirpus isolepis but differing in the long mucronate glumes.

(Received 5th. October 1964)

Explanation of Figures

PLATE I

Fig. 1. Bulbostylis holotricha - x 1
Fig. 2. Bulbostylis humilis - x 1
Fig. 3. Bulbostylis glaberrima - x 1
Fig. 4. Fuirena leptostachya - x 25
Fig. 5. Fuirena ciliaris - x 25
Fig. 6. Bulbostylis buchananii - x 1
Figs. 7,21. Fuirena calolepis - 7,x 20; 21,x 1
Fig. 8. Fuirena claviseta - x 20
Fig. 9. Bulbostylis densa - x 1
Figs.10,11,18. Bulbostylis boeckeleriana - 10,x 15; 11,x 15; 18,x 1
Fig. 12. Ficinia filiformis - x 15
Fig. 13. Ficinia gracilis - x ½
Fig. 14. Fuirena stricta - x 1
Fig. 15. Fuirena umbellata - x 20
Fig. 16. Bulbostylis schimperiana - x 15
Fig. 17. Bulbostylis atrosanguinea - x 15
Fig. 19. Bulbostylis aphyllanthoides - x 1
Fig. 20. Fuirena abnormalis - x 1

PLATE II

Fig. 22. Fimbristylis longiculmis - x 10
Figs.23,39. Fimbristylis exilis - 23,x 10; 39,x 1
Fig. 24. Fimbristylis madagascariensis - x 10
Fig. 25. Fimbristylis miliacea - x 1½
Fig. 26. Eleocharis dulcis - x 5
Fig. 27. Eleocharis complanata - x 1½
Fig. 28. Fimbristylis dichotoma - x 10
Figs.29,32,41. Eleocharis acutangula - x 5
Fig. 30. Fimbristylis obtusifolia - x 1
Fig. 31. Fimbristylis oligostachys - x 1½
Fig. 33. Eleocharis caribaea - x 1½
Fig. 34. Fimbristylis humilis - x 1½
Figs.35,36. Fimbristylis squarrosa - 35,x 1½; 36,x 15
Fig. 37. Eleocharis atropurpurea - x 2
Fig. 38. Fimbristylis complanata - x 1
Fig. 40. Fimbristylis monostachya - x 1½

PLATE III

Fig. 42. Lipocarpha monocephala - x 1½
Fig. 43. Scirpus maritimus - x 6
Figs.44,55. Scirpus cubensis - 44,x 6; 55,x 1
Figs.45,47. Scirpus costatus - 45,x 1; 47,x 15
Fig. 46. Scirpus setaceus - x 1½
Fig. 48. Scirpus confusus - x 15
Fig. 49. Scirpus roylei - x 1
Fig. 50. Scirpus praelongatus - x 1
Fig. 51. Lipocarpha chinensis - x 1½
Fig. 52. Scirpus isolepis - x 1½
Fig. 53. Scirpus steudneri - x 1
Fig. 54. Scirpus inclinatus - x 1
Fig. 56. Scirpus mucronatus - x 1

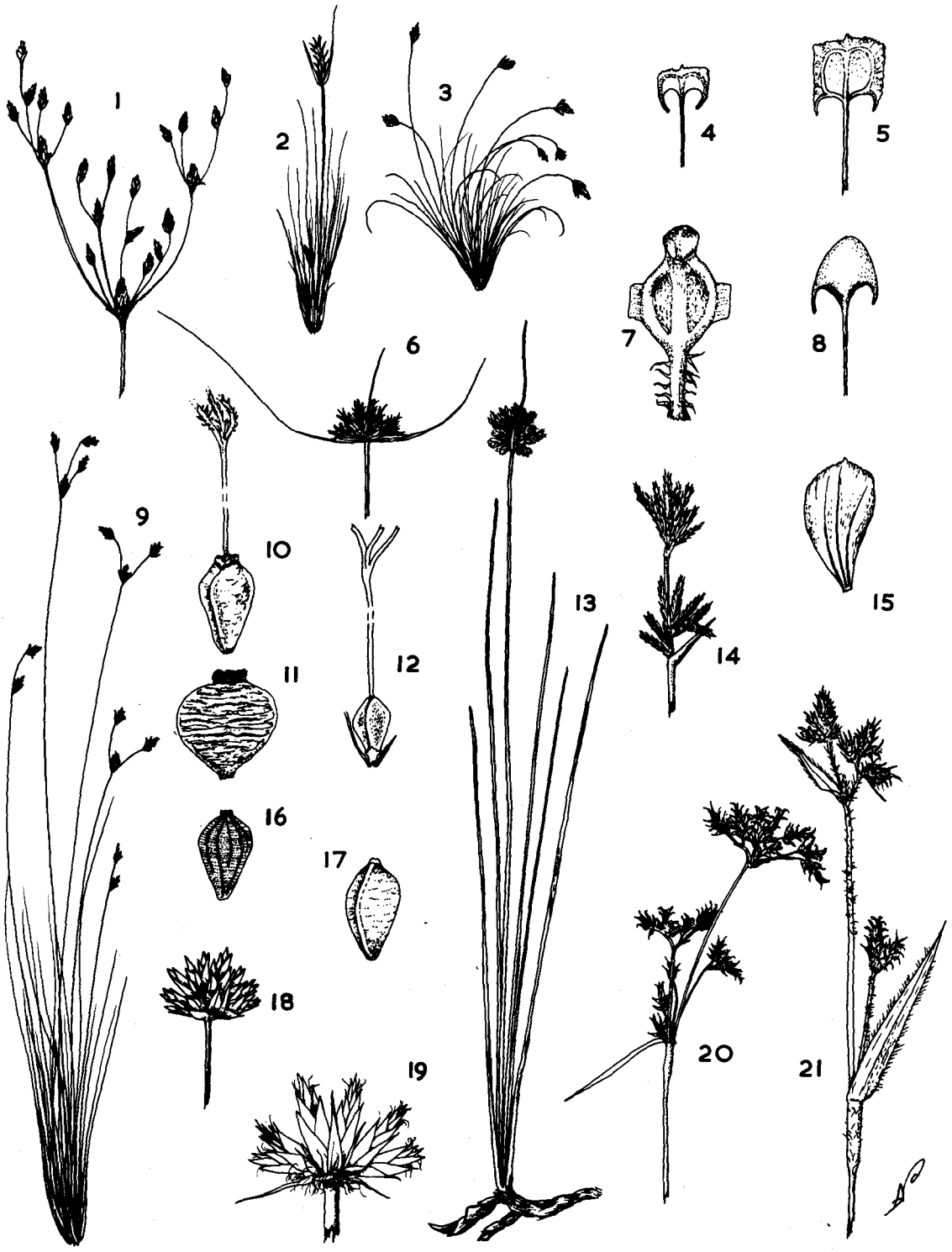

PLATE I

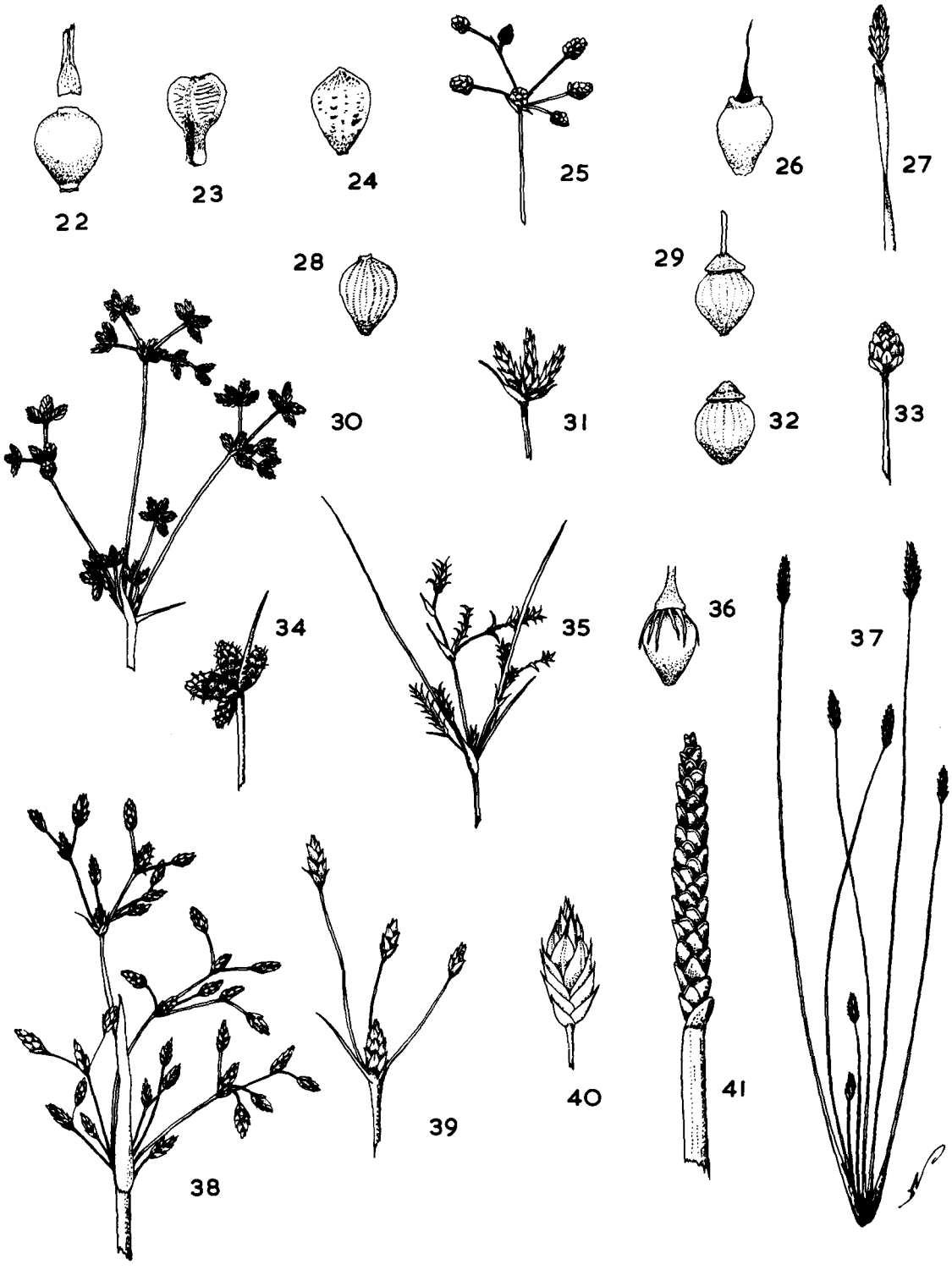
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PLATE III